State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES
Southern District
3911 Fish Hatchery Road
Madison, WI 53711

Carroll D. Besadny
Secretary

September 1, 1982 4400

Mr. James W. Garvin, P.E.
Donahue & Associates, Inc.
4738 North 40th St.
Sheboygan, WI 53081

Dear Mr. Garvin:

This letter is to acknowledge receipt of an operations and abandonment plan for the city of Ripon Sanitary Landfill located in the SE¼ of the SE¼ of Section 7, T16N, R14E, Town of Ripon, Fond du Lac County by the Department of Natural Resources on August 3, 1982.

If you have any questions, please contact David Hantz at (608) 267-9409.

Sincerely,

Floyd F. Stautz
Asst. District Director-Env. Protection

DH:cmt
cc: Residual Management Section - SW/3 (#467)
Systems Management Section - SW/3 (#467)
Mr. Claude Lee, Director of Public Works, City of Ripon, 110 Jackson St., Ripon, WI 54971
BSWM - SW/3 (#467)
Horicon Area Office
Mark Giesfeldt
David Hantz

Donohue

July 21, 1982

City of Ripon
110 Jackson Street
Ripon, WI 54971

Attn: Mr. Claude Lee
Director of Public Works

Re: Operations and Abandonment Plan
Donohue Project No. 11829.000

Dear Mr. Lee:

We are pleased to present our completed "Operations and Abandonment Plan" for the City of Ripon Sanitary Landfill. The report discusses general and specific site operations in conjunction with phased abandonment.

We are forwarding ten copies of the report to you for internal distribution. Additionally, we are forwarding four copies to Ken Hein of the DNR.

We are pleased to have had this opportunity to work with the City of Ripon on this project, and wish to thank you for your fine cooperation. Please feel free to contact us if we can be of further assistance to you. As discussed, when the DNR has had an opportunity to review the report we will meet with the City to discuss their comments and to initiate the closure procedure at the landfill.

Sincerely,

DONOHUE & ASSOCIATES, INC.

James W. Garvin

James W. Garvin, P.E.
Project Manager

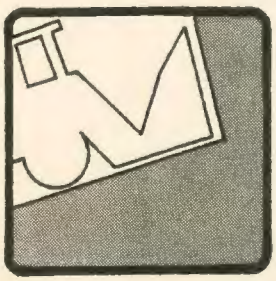
SCR/bb

enc: Ten Copies of Operations and Abandonment Plan

cc: Ken Hein, DNR

Donohue & Associates, Inc.
4738 North 40th Street
Sheboygan, Wisconsin 53081
Engineers & Architects
414-458-8711

Donohue



Operations and Abandonment Plan

City of Ripon Landfill
Fond du Lac County, Wisconsin

Prepared for
City of Ripon

July 1982

Donohue & Associates, Inc.
Engineers & Architects

OPERATIONS AND ABANDONMENT PLAN

CITY OF RIPON LANDFILL
FOND DU LAC COUNTY, WISCONSIN

I hereby certify that this report was prepared under my direct supervision and that I am a duly Registered Professional Engineer under the Laws of the State of Wisconsin.

7/22/82
Date

James W. Garvin
James W. Garvin, P.E.

Registration No. E-13779

DONOHUE
Engineers/Architects
Sheboygan, Wisconsin

Project No. 11829.000

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CHAPTER 1

INTRODUCTION

INTRODUCTION

This report discusses the general and specific site operations in conjunction with phased abandonment of the City of Ripon landfill site. The intent of the report is to provide guidance to the operators on proper operation and to facilitate proper phased abandonment.

PURPOSE AND SCOPE

The scope of services are as follows:

1. Discuss the daily operations including waste types accepted or excluded; typical waste handling techniques; hours of operation; traffic routing; drainage and erosion control; windy, wet and cold weather operations; manpower requirements; sequencing; and other details of the daily operations of the landfill.

2. Prepare a conceptual final grading plan.

3. Prepare the necessary cross-sections and estimate the remaining site life of the landfill.

4. Prepare a drainage plan to show the direction of surface water flow during and at completion of the landfill operation.

5. Prepare site closing information consisting of a discussion of the anticipated sequence of events for site closing.

6. Summarize the financial obligations of the City for landfill abandonment.

7. Prepare a final land use plan addressing potential recreational facilities and adjacent topography.

8. Prepare a report summarizing the operations and abandonment plan.

GENERAL SITE INFORMATION

GROUND WATER FLOW, QUALITY, ; MONITORING (?)

General site information is included on the following page.

GENERAL SITE INFORMATION

Name of Site: City of Ripon (#467)

Address of Site: CTH "NN" - Ripon, Wisconsin

Site Location: SE 1/4 of the SE 1/4 of Section 7, T16N - R14E, Town of Ripon, Fond du Lac County, Wisconsin

Owner/Operator: Leased by City, operated by private contractor (Randy Hein Excavating)

Remaining Site Life: 4-5 years

Licensed Acreage: 7.3 Acres

Total Acreage: 7.3 Acres

Present Property Owner: Mrs. Arline L. Sauer

Agencies Served: City of Ripon,
Town of Ripon

Waste Types: Typical municipal, commercial, and industrial solid waste, including garbage, refuse, combustible and non-combustible waste, brush, trees, and municipal sludge.

Covering Frequency: Daily

Estimated Weekly Quantities: 125 tons/week

Mode of Operation: Area fill

Contact: Mr. Claude Lee
Director of Public Works
110 Jackson Street
Ripon, WI 54971

Submittal Prepared by: Donohue & Associates, Inc.
4738 North 40th Street
Sheboygan, WI 53081

Project Manager: James W. Garvin, P.E.

Project Engineer: Stephen C. Reinfeldt, P.E.

Geologist: Stephen J. Haverl, P.G.

CHAPTER 2

GENERAL SITE OPERATIONS

GENERAL BACKGROUND INFORMATION

The City of Ripon solid waste disposal site is located in the SE 1/4 of the SE 1/4 of Section 7, T16N - R14E. The operation of the 7.3 acre site began in 1963. The City maintains a sanitary landfill (license #467) under Department of Natural Resources classification standards. The facility is leased and was operated by the City of Ripon, but presently a contractor provides daily operational needs. In addition to the City of Ripon, the Town of Ripon also uses this landfill.

Appendix A contains correspondence from the DNR regarding the City of Ripon landfill site. * SEE NEXT PAGE ←

GENERAL SITE OPERATIONS

Waste Types and Quantities

Based on information provided by the City of Ripon officials, the existing landfill operation receives the equivalent of 6,600 tons of refuse per year. Using an in-place compaction density of 600 lbs/yd^3, it is estimated that the landfill site receives approximately 22,000 cu yds of refuse per year. These volume estimates will be used to estimate the remaining site life. SLUDGE QUANTITY (?)

The site presently serves a population of 8,500 town and city residents, and an additional 1,000 students at the Ripon College. The site is used by the City of Ripon and the Town of Ripon.

Waste types consist of typical municipal, commercial, and industrial solid waste, including garbage, refuse, combustible and non-combustible demolition waste, brush, trees, and municipal sludge.

Entrance Area

The general appearance of the visible portion of a landfill is important in the acceptance by surrounding residents. The entrance area serves as an interface between the sanitary landfill and the surrounding area. Proper signing, absence of litter, absence of mud from the roadway and well maintained vegetative cover enhances the overall appearance of the site. The visual appearance of the entrance area to the landfill should be improved to enhance the acceptance of the landfill by surrounding residents.

Fencing and Signs

To prevent unauthorized access or disposal, a perimeter fence should be placed around the entire boundary of the site. The gate at the entrance to the site should be repaired, other gates should be removed and replaced with fencing. A secure locking device should be included with the gate also. The perimeter fence and gate should be periodically checked for damage and should be cleaned of any accumulated blown paper and debris. The estimated cost for the perimeter fence and lockable gate is $8,000. KEYS SHOULD NOT BE PROVIDED TO WASTE HAULERS.

A readily noticeable sign has been placed near the entrance to the landfill. The hours of operation are posted on the sign. The wastes not accepted, fees charged, and the name, address, and telephone number of the operating body should also be included.

Hours of Operation

Since the Ripon landfill site is a relatively small operation, the landfill operations are accomplished during normal working hours. The operating hours will remain the same;

Monday and Friday - 12:00 to 3:30
Tuesday, Wednesday, and Thursday - 8:30 - 3:30
Saturday - 8:00 - 3:30 (closed first Saturday of each month)

Roadway

An important element in efficient landfill operation is accessibility and traffic flow. An internal road streamlines operations and prevents disposal of refuse at undesired locations. To ensure year-round operation, the road should be constructed of an all-weather material. In addition, the road should be kept in good condition at all times and be free of refuse, debris, and mud. NEEDS TO BE DONE

Waste should be deposited at the toe of the working face, because it can be compacted better there since it is worked up the slope rather than down. Scavenging should not be permitted, and no vehicles should be left unattended at the landfill site. Once the vehicle has deposited its load, it should leave immediately. All refuse vehicles should enter and exit via the main entrance area and roadway.

Control of Surface Water

Ponding water has occurred at the site in the past. In July of 1981, samples were taken at the pond located in the northeast corner of the site and analyzed to determine the acceptability of the water at the Ripon wastewater treatment plant. Appendix G contains the results of the chemical analyses. DRAINAGE ALONG S. FACE (3)

Surface water drainage courses should be diverted from the sanitary landfill by employing drainage swales. Drainage swales should be located upgradient of the active fill areas to prevent surface water from flowing over the exposed refuse. Surface water that runs over stockpiled cover material may contain suspended solids and should not be allowed to enter water courses unless it has been ponded to remove settleable solids. Generally, it is advantageous to divert runoff around stockpiled areas via drainage facilities to prevent runoff of sediments.

The drainage swales will be routed to a drainage ditch along CTH NN. Contact must be made with the County Highway Engineer to ensure proper location and sizing of the necessary roadside ditches.

Groundwater Monitoring

The following list presents the monitoring wells located at the site, along with the current status:

Well No.	Date Installed	Status
1	1974	Buried
2	1974	Buried
3	1974	Buried
4	1974	Buried
5	October, 1981	Operational
5A	May, 1982	Operational
6	October, 1981	Operational
7	March, 1982	Operational
8	October, 1981	Operational

Boring logs and well installation diagram for observation wells 5, 5A, 6, 7, and 8 are included in Appendix B. Appendix D contains a groundwater contour map for the site based on groundwater elevations taken in June of 1982.

Several attempts have been made to locate the four observation wells buried during previous landfill operations. When repeated excavations with a back-hoe failed to locate three of the wells, it was concluded that additional efforts would be unwarranted.

Table 1 presents groundwater level readings for the operative wells. Table 2 presents the results of the groundwater chemical analyses. During continued site operation, elevation readings and groundwater samples should be taken from the observation wells quarterly.

TABLE 1

WATER LEVEL MEASUREMENTS
City of Ripon Landfill

Well No.	Elevation at Top of PVC	Ground Elevation	November 20, 1981		March 29, 1982		June 25, 1982	
			Depth to Water	Water Surface Measurement	Depth to Water	Water Surface Measurement	Depth to Water	Water Surface Measurement
5	869.91	868.01	48.75	821.16	48.6	821.31	47.75	822.16
5A	869.28	867.92	NR	---	NR	---	47.77	821.51
6	862.74	860.74	39.33	823.41	38.0	824.74	38.45	824.29
7	866.88	864.91	NR	---	NR	---	42.54	824.34
8	847.72	845.42	23.92	823.80	23.0	824.72	23.07	824.65

NR - No reading, observation well not installed at this time.

TABLE 2

GROUNDWATER CHEMICAL ANALYSIS
City of Ripon Landfill

Parameter	November 20, 1981			June 25, 1982				
	50W	60W	80W	50W	5A	60W	70W	80W
pH	8.03	7.07	7.24	6.81	7.49	6.85	7.20	6.92
Specific Conductivity (µmhos/cm)	807	1,287	1,486	1,620	710	1,185	1,305	2,785
COD - Soluble (mg/l)	16	46	43.5	38.0	65.0	8.7	43.1	73.0
Iron (mg/l)	0.20	0.47	0.36	7.9	0.49	0.17	0.53	1.2
Hardness (mg/l as $CaCO_3$)	204	307	394	228	397	613	572	825
Alkalinity (mg/l as $CaCO_3$)	303	342	542	522	333	592	553	1,110
Chloride (mg/l)	47	228	208	~~1,620~~ 233	~~710~~ 18	~~1,185~~ 36	~~1,305~~ 86.4	~~2,785~~ 359
Sulfate (mg/l)	64	4	22	<1	23.2	38.5	39.5	24.0

WITH THESE ELEVATED PARAMETERS, A CEASE & DESIST ACCEPTANCE SHOULD BE QUESTIONED.

CHAPTER 3

SPECIFIC OPERATIONS AND ABANDONMENT

PRESENT SITE OPERATIONS

Landfill operations at the City of Ripon landfill site employ the area-fill method. Open burning is not practiced. Waste is covered daily. Sludge is accepted at the site. There is a white goods salvage area. However, this area should be relocated near the site entrance. Cover material is obtainable from the quarry operation located west of the existing landfill. Adequate cover material should be available on-site for abandonment and continued operations. Appendix C contains an Existing Site Conditions Plan Sheet illustrating present grades and other physical features of the site.

PROPOSED OPERATION

The efficient operation of a landfill site requires good management and an organized operation plan. Good management practices include sound operations at the site, compliance with current regulations, and efforts to prevent nuisance conditions at the site. The public is seldom aware of the planning efforts involved in a landfill operation and often will judge a project on its operational phase only. Competent and properly trained personnel are essential to promoting a positive image.

Adverse Weather Conditions

If blowing litter becomes a problem at the site, portable fences should be placed within the fill areas down wind of the working face to collect windblown litter. During extremely windy conditions the operator should make provisions for pickup of the windblown litter collected along the perimeter fence line. This practice will decrease the amount of litter that could be transported off site.

The material used for intermediate and daily cover at the site should be protected from freezing in the wintertime. Hay, straw, or leaves could be used for covering all borrow areas. Under snowy conditions, the snow will have to be cleared from the access road as required. The landfill operator should remove the snow from the working area and active fill areas, as necessary, using on-site equipment.

Access to the landfill site during wet weather can be difficult if proper precautionary measures are not employed. The primary access road to this site must be maintained in a suitable driving condition. Potholes and settlement in the roadbed should be filled with gravel or demolition type material and regraded to provide proper drainage.

The access road leading from the primary entrance site road to the active landfill area should also be adequately maintained. Collection vehicles entering and departing to and from the active landfill areas should be encouraged to utilize the same route.

Handling of Unusual Waste

Occasionally the landfill will accept unusual waste, such as dead animals or otherwise highly putrescible waste. In such cases the waste will be covered immediately with at least one-foot of daily cover material. This landfill will accept bulky waste. However, the operator has been granted permission to salvage white goods.

Dust Control

To date, dust nuisances originating from the present landfill operations have not been a serious problem. Due to the lack of dust problems with the existing site, there will be no formal dust control program other than watering any localized dust problems.

Daily Cleanup

Any wind blown litter or other waste material will be picked up on an as-needed basis from all perimeter fencing and returned to the working face. On extremely windy days paper pickup may be required more than once per day.

Salvaging

Salvaging by the operator is allowed at the City of Ripon landfill site.

Horizontal and Vertical Control

Appendix C contains an existing site conditions plan sheet. A grid system has been established on the plan sheet. A topographic survey of the site is shown on the base map for the existing site conditions sheet. Vertical control has been established at the site and is referenced to the temporary bench mark in the power pole, west of CTH NN (USGS datum).

Landfill Sequencing and Phased Abandonment

Appendix E contains the final grades and drainage for the site. Cross sections are contained in Appendix F and illustrate existing and final topography.

The sequence for continued landfill operation and partial abandonment is presented on the final grading and drainage plan sheet. Filling will begin in the southern portion of the landfill and proceed in a northerly direction.

Site Capacity

The final grades allow for approximately 4-5 years of additional refuse disposal at the City of Ripon landfill. Approximately 125,000 cubic yards of air space are available for filling based on the final grades presented in Appendix E.

GENERAL REQUIREMENTS FOR ABANDONMENT

Sequence of Events for Closing

The following items provide a sequencial order of events which should be accomplished when closing a landfill site:

- At least 120 days prior to closure, the owner shall notify the DNR and users of the facilities of the intent to close the site.
- At least 60 days prior to closure, the following items shall be accomplished: the landfill area must be covered with a minimum of two feet of compacted soil, sloped to provide for runoff; surface water runoff must be diverted or conveyed through drainage ditches lined with clay; at least six inches of topsoil must be used to topdress abandoned fill areas.
- Within 10 days after terminating operation, the owner shall restrict access to the site, post notification of closure as well as the location of alternate disposal sites, and shall publish notification of closure in the local newspaper, forwarding a copy of such notification to the DNR.
- Abandoned landfill areas shall be seeded with native grasses and mulched and fertilized within 90 days after closure to re-establish vegetative growth.
- The site shall be inspected and maintained by the owner until it becomes stabilized, or until the owner's responsibility terminates, in accordance with the approved abandonment plan.

Final Grades and Drainage

The general requirements for final closure are set forth in subsection NR 180.13(12) of the Wisconsin Administrative Code entitled "Closure." The requirements state that:

1. Top slopes should be no less than 2 percent and side slopes no steeper than 33 percent.
2. Erosion and sedimentation of filled areas shall be limited by placement of berms and drainage swales. Whenever it is necessary to divert surface water over previously filled areas, drainage ditches must be constructed with two feet of clay liner in accordance with the Wisconsin Administrative Code.

A conceptual final grading plan providing for at least two feet of cover material and six inches of topsoil has been included in the operations and abandonment plan and is presented in Appendix E. Final grading plans were developed using a minimum of 4 percent slope as required by the DNR. Drainage swales are to be constructed as shown on the final grading plan for the abandoned site. The drainage swales will prevent precipitation runoff from entering the waste site.

Total cost for achieving final grades and drainage is estimated to be $500. The breakdown for this estimate is as follows:

Item		Cost
1.	Grade surrounding area to reduce run-on	$1,000
	Total	$1,000

Final Cover Materials

The Wisconsin Administrative Code requires that all areas previously used for disposal purposes must be covered with at least two feet of compacted earth, sloped adequately to provide surface water runoff. Fine textured soils should be used for final cover material to minimize surface water infiltration. Final cover soils should have 50 percent fines passing a No. 200 sieve.

As final covering for the site, six inches of topsoil should be placed over the final cover soil and upon all borrow areas. The purpose of the topsoil is to keep the soil moist, thereby minimizing cracking, and to provide a suitable growth medium for vegetation. Cross-sections of the final grading plan are presented in Appendix F. A typical detail of final cover materials is also included in Appendix F.

Table 3 summarizes the estimated quantities of cover materials required for closure of the City of Ripon landfill site.

Total cost for final cover materials is estimated to be $24,900. The breakdown for this estimate is as follows:

Item		Cost
1.	Cap the entire site with clay (present day cost of $0.30/yd^3 subject to increase - 20,000 cu yds)	$ 6,000
2.	Place topsoil (6,300 cu yds)	$18,900
	Total	$24,900

Site Revegetation and Screening

The first step in establishing and maintaining a dense vegetative growth upon the site is to shape and slope the area. A minimum slope of two percent is required by the DNR for the site. A six-inch layer of topsoil will be placed as a final graded surface. All topsoiled areas should be fertilized prior to seeding. One application of fertilizer should be applied to initiate the growth of grasses. The fertilizer should be worked into the soil to a depth of approximately three inches using ordinary tillage methods. Once the seeded vegetation reaches maturity, the fully developed root systems should be capable of sustaining future growth. It is anticipated that future fertilizer applications will not be required.

TABLE 3

ESTIMATED FINAL COVER MATERIALS
City of Ripon Landfill

Soil Material	Approximate Volumes (cu yd)
Clay - 2' seal for landfilled area and drainage ditches	20,000
Topsoil - 6" layer over drainage ditches, borrow, and landfilled areas	6,300
TOTAL COVER MATERIAL	26,300

Several species of grasses and legumes best suited for reseeding of the disturbed areas are listed in Table 4. Legumes should be used in the spring. Shorter grasses should be used in the fall. A mechanical seeder should be used to spread the seeds evenly over the entire surface area.

Normally, the last step is to uniformly mulch the area with hay or straw. Mulching protects the seeds from adverse weather conditions and minimizes erosion by water or wind during seed germination. Mulch material should be applied evenly at a rate of one-half to one ton per acre, six to seven stems thick.

Tree plantings should be placed along the western edge of the landfill site and within the property fence. Additional plantings may be required in the northeast corner of the site. The plantings will visually screen the site from the roadway. It is important that the plantings be planted in the very near future.

Total cost for site revegetation is estimated to be $8,500. The breakdown for this estimate is as follows:

Item		Cost
1.	Seed, fertilizer, and mulch area	$7,500
2.	Plantings	$1,000
	Total	$8,500

Future Site Maintenance

Inspection and maintenance of landfill sites by the owner are required until the area becomes stabilized. Any sizeable depressions or changes in surface grade resulting from settling of the decomposing refuse should be immediately filled, reseeded, and mulched, since depressions can result in improper drainage and may permit surface water to infiltrate the cover material and reach the underlying refuse.

Additionally, dense vegetation must be maintained on side slopes of filled areas, borrow areas, ditch banks, and drainage ditches to prevent erosion and sedimentation, which could also result in restricted surface water runoff. As part of a continuing site maintenance program, barren or sparsely vegetated areas should be tilled, reseeded, and mulched as necessary to re-establish vegetative growth.

As part of a maintenance schedule to ensure site stabilization, the landfill site should be inspected semi-annually. The inspection should normally be conduc ted in the fall and spring for several years following abandonment, generally for a three-year period. For the remainder of the long-term maintenance program, the site should be inspected annually for potential problems.

TABLE 4

SEEDING MIXTURES AND APPLICATION RATES
City of Ripon Landfill

Item	Species/Type	Rate per Acre
Fertilizer	10-10-10	500 lb
	20-10-10	500 lb
	12-12-12	500 lb
Spring Seeding		
Alternative #1	Empire Birdsfoot Trefoil*	8 lb
	Kentucky Bluegrass	6 lb
	Creeping Red Fescue	5 lb
Alternative #2	Empire Birdsfoot Trefoil*	8 lb
	Kentucky Bluegrass	5 lb
	Smooth Brome	8 lb
	Tall Fescue	8 lb
	Annual Rye Grass	5% by weight
Fall Seeding		
Alternative #1	Kentucky Bluegrass	16 lb
	Creeping Red Fescue	8 lb
	Annual Rye Grass	5-10% by weight
Alternative #2	Kentucky Bluegrass	2 lb
	Smooth Brome	20 lb
	Tall Fescue	10 lb

*Trefoil is a legume and should be used for spring planting only. Trefoil must be innoculated prior to seeding.

Total cost for future site maintenance is estimated to be $1,000. The breakdown for this estimate is as follows:

Item		Cost
1.	Periodic facility inspection	$ 500
2.	Routine maintenance activities	$ 500
	Total	$1,000

Future Groundwater Monitoring

A background sample series has been obtained from each well. Samples should be gathered quarterly for the first three years following abandonment and analyzed to determine the concentration of the following parameters:

1. pH
2. COD
3. Chloride
4. Sodium
5. Nitrate Nitrogen
6. Specific Conductance
7. Groundwater Elevation

Following the first three years, samples should be collected and analyzed annually.

Total cost for future groundwater monitoring is estimated to be $300/collection period.

The following observation wells 5OW, 5A, and 7OW will need to be extended during the time period that final grades are being achieved.

Future Gas Monitoring

The possibility of explosive gases migrating from the decomposing refuse is a matter of concern, as the naturally occurring sandy soils are conducive to gas migration. Gas migration is not a potential hazard at the City of Ripon landfill site due to the rural nature of the site. The area is surrounded by agricultural land without human habitation in close proximity.

Final Landfill Uses

Most restored landfill sites are ultimately used for recreational purposes, due to the peculiar problems associated with such areas, such as poor bearing capacity of surface layers, settlement over decomposing refuse, and the possibility of the accumulation of dangerous gases in the refuse cells.

The microbial decomposition of compacted refuse generally continues for a number of years, and the resulting chemical and structural changes can lead to shifting of the cover material. This type of movement would seem to preclude the building of permanent structures on filled areas.

Uses of adjacent properties must also be considered when determining the eventual utilization of landfills; final uses must conform with land uses and zoning of the surrounding areas.

Most completed landfill sites are eventually used as a passive recreational area or open areas within tree plantings. Once the reseeded vegetation matures, it will be ideal for forage and nesting habitat of the numerous wildlife species that abound in the area. The plantings should be planted in the near future.

Summary

The following cost summary presents the actual costs involved in continued operation and phased abandonment of the City of Ripon landfill site:

Item		Estimated Cost
1.	Perimeter fencing	$8,000
2.	Final grades and drainage	$1,000
3.	Final cover materials	$24,900
4.	Site revegetation and screening	$8,500
5.	Future site maintenance	$1,000/year
6.	Future groundwater monitoring	$1,200/yr (for first 3 yrs following closure and $300/yr thereafter)

APPENDIX A

CORRESPONDENCE RECEIVED FROM DNR

State of Wisconsin \ DEPARTMENT OF NATURAL RESOURCES

Carroll D. Besadny
Secretary

BOX 7921
MADISON, WISCONSIN 53707

December 30, 1981

IN REPLY REFER TO: 4400

Mr. Claude A. Lee
Department of Public Works
City Building
100 Jackson
Ripon, WI 54971

Re: Groundwater Monitoring at the
City of Ripon-Town of Ripon Landfill,
License No. 467

Dear Mr. Lee:

The Bureau of Solid Waste Management, Department of Natural Resources, has completed its review of the recently installed monitoring system at the City of Ripon-Town of Ripon landfill. The monitoring system was presented to the Department by Donohue and Associates, Inc. in a letter dated November 17, 1981 and received November 19, 1981.

The original purposes of the monitoring system were to determine groundwater flow directions in and around the site and to provide sampling points for long-term monitoring of groundwater quality. Three water table observation wells were installed which meet Departmental specifications for such wells. New well #1 is located in the southwest corner of the site in poorly to well graded sands and silty sands (classified SP, SP-SM, SM and SW in the Unified Soil Classification System). New well #2 was emplaced in the southeast corner through 11 feet of silty soils (ML in the USCS) underlain by poorly graded sands (SP in the USCS). One large, seven-foot diameter limestone boulder was encountered during the drilling of this well. The upper seven feet of the well's screen is surrounded by this boulder, including the portion where the water table presently intersects the well screen. New well #4, in the northeast corner, was emplaced in four to eight feet of fill which overlies poorly to well graded sandy soils. A 15-foot well screen in each well was positioned such that approximately five feet of screen remained above the water table. This configuration should accommodate the widely fluctuating water levels historically observed in the vicinity of this site. It is our understanding that physical difficulties in the field prevented installation of two additional proposed wells. A fourth observation well was to have been located in the northwest corner of the site. A fifth well, located adjacent to a downgradient observation well and constructed as a piezometer with a maximum five-foot screen at least 15 feet below the bottom of the observation well's screen, would have provided information with regard to vertical gradients at the site. The three new wells and any existing old wells (particularly old well #3, if found) were sampled on November 20, 1981, according to Ken Hein, DNR District Solid Waste Specialist. Water elevations were to have been taken and water samples taken and analyzed in accordance with NR 180.13(11)(a)f, with the addition of sulfate.

The Department's analysis of the information enclosed with the November 17, 1981 Donohue letter is as follows. Water level elevations at the time of well construction were:

Well #1:	53.6 feet
Well #2:	55 feet
Well #4:	53.8 feet

Elevations have been rounded to significant digits and are relative to an assumed datum which is based on a nail in a power pole in the southwest corner of the property. Based on these values, it appears that groundwater flow is toward the north and west away from the southeast corner of the site. This is contrary to what would be expected from historic data and from the regional topography which both suggest a southwesterly gradient. Also, the gradient is much steeper, by approximately an order of magnitude, than has been formerly observed at the site. The November 1981 monitoring results may be instructive as to whether or not this apparent flow situation is temporary or long-term.

While the presence of the large boulder surrounding the upper portion of the screen of well #2 may be of concern, it is the Department's opinion that well #2 would accurately reflect the position of the water table since theOsand backfill in the borehole allows for pressure equalization both above and below the boulder. It should be remembered, however, that water sampled from this well would be obtained from the lower 8 feet of screen rather than the entire 15 feet, as long as the water table remains below the top of the boulder. In this case, concentrations of contaminants near the water table may not be described in this well.

The Department recommends the following with respect to the groundwater monitoring program:

1. The elevation of the end of well #2 should be determined to at least 0.1 foot accuracy.

2. Water level elevations should be taken to 0.01 foot accuracy. This is necessary in order to determine groundwater flow directions where such a gently-sloping water table is expected.

3. The fourth and fifth proposed well should be installed. The fourth well should be placed in the northwest area of the site. The fifth well should be placed as close to new well #1 in the southwest corner and be screened at least 15 feet below the bottom of the screen of well #1. Its screen should be no longer than five feet and should be protected from possible contamination by the placement of an impermeable seal immediately above the screen.

4. The numbering scheme of the new wells should be altered so as to avoid confusion with identically-numbered old wells at other locations in the fill area.

5. The assumed datum should be tied in with the United State Geological Survey datum used on topographic maps. This is strongly recommended since both the nail and the power pole are temporary landmarks.

6. Sulfate may be dropped from the list of parameters to be monitored. Its original inclusion in the list was a result of a Departmental misunderstanding regarding waste types which have been placed in the landfill.

7. Should any of the new wells cease to function or be destroyed, the Department must be notified in writing immediately. In either case, such wells must be properly abandoned and replaced within 60 days of notification to the Department unless the City is notified otherwise in writing by the Department. This is a requirement of NR 180.13(11)(a)6, Wisconsin Administrative Code. Any old wells which may be found are to be reported to the Department, surveyed and properly abandoned.

While the Department is not requiring that the City implement the above points (with the exception of number 7, which is a requirement of NR 180), we strongly recommend that the City does so. In view of the highly permeable soils and high water table conditions which exist at this site, it is extremely important that a groundwater monitoring program be established which will define flow patterns, evaluate the extent of any existing contamination, and estimate directions of potential contaminant migration. This information is needed very soon in order to prepare for the orderly completion and proper abandonment of the landfill site.

Please respond to the Department in writing at your earliest convenience regarding the recommendations outlined in this letter. We would also appreciate receiving the results of the November 20, 1981 monitoring round as soon as they are available. If you have any questions, you may contact me at (608) 267-7568 or Ken Hein at (414) 485-4434.

Sincerely,
Bureau of Solid Waste Management

Barbara J. Bickford

Barbara J. Bickford, Hydrogeologist
Residuals Management and Land Disposal Section

BJB:ucd/0793Y
cc: J. Frank/K. Hein - Horicon Area
S. Haverl/R. Klink - Donohue & Associates, Inc.

January 29, 1982

Bureau of Solid Waste Management
Department of Natural Resources
P.O. Box 7921
GEF-2
Madison, WI 53707

Attn: Ms. Barbara Bickford

Re: City of Ripon Sanitary Landfill
Donohue Project No. 11829.000

Dear Ms. Bickford:

In response to your review letter dated December 30, 1981, this letter presents our proposals concerning your recommendations for the Ripon Sanitary Landfill. Our proposals follow a point by point discussion of your recommendations.

1. A review of data was conducted with the geotechnical firm responsible for well installation. Their records indicate that 47.0 feet of well stem and screen were installed below grade. Accordingly, the elevation of the well end is 44.9 (rounded to assumed local datum).

2. Water levels recorded on November 20, 1981 were taken at .01 accuracy. Groundwater elevations recorded on that date are:

   Well #1 - 52.28
   Well #2 - 54.55
   Well #4 - 54.92

   Elevations are relative to assumed local datum.

3. In response to your request for installation of two additional wells, we are currently soliciting price quotations from several geotechnical firms. Upon receipt of those quotes we will proceed with the additional work.

4. To prevent further confusion regarding "old" and "new" wells, we propose the following renumbering of the recently installed wells:

Existing Well #	Proposed Well #
Well #1	Well B-5
Well #2	Well B-6
Well #4	Well B-8

5. United States Geological Survey (USGS) datum will be provided at our earliest opportunity.

6. Although sulfate analyses have been conducted on previously obtained samples, this analysis will no longer be conducted.

7. The requirements of NR180.13(11)(a)6, will be adhered to.

We feel that these remarks should satisfy your requests. Also enclosed is a copy of the chemical analyses performed on the groundwater samples obtained on November 24, 1981.

Should clarification of this discussion or further information be necessary, do not hesitate contacting us.

Very truly yours,

DONONHUE & ASSOCIATES, INC.

James W. Garvin, P.E.
Associate

CITY OF RIPON

Claude A. Lee
Director of Public Works

JCB/dlc

enc: As noted

APPENDIX B

BORING LOGS AND WELL INSTALLATION DIAGRAMS

Donohue

November 17, 1981

State of Wisconsin
Department of Natural Resources
P. O. Box 7921
Madison, WI 53707

Attn: Ms. Barbara Bickford
Bureau of Solid Waste Management

Re: City of Ripon Landfill
License No. 467
Donohue Project No. 11829

Dear Ms. Bickford:

In accordance with the authorization of the City of Ripon, we have completed installation of new monitoring wells at the referenced site. The purpose of the monitoring wells is to determine the position of the phreatic surface beneath the site and to provide groundwater sampling points for long-term water quality analyses.

The monitoring well array consists of three wells completed at varying depths so that ten feet of screen occurs below the water table and five feet above. Our original intention was to place four wells at the corners of the site to account for all spatial conditions. During field efforts, however, extreme difficulty was encountered in the northwest corner precluding completion of that well. Subsequent review of the water table and geologic data indicates pronounced uniformity of stratigraphic conditions and low gradients slightly falling to the southwest. We feel that the three well array will provide acceptable monitoring control within the operative budget constraints. Complete soil boring logs and well installation diagrams are attached.

Water analytic parameters will be performed in accordance with NR 180.13,(11), (a), 7 and will include water elevation, field pH, field conductivity, COD, dissolved iron, hardness, chloride, sulfate, and alkalinity. We anticipate acquisition of the first series of samples during the third week of November and will forward the data when complete.

Donohue & Associates, Inc.
4738 North 40th Street
Sheboygan, Wisconsin 53081
Engineers & Architects
414-458-8711

I trust you will find this discussion in order. If you have any questions, please feel free to call me.

Sincerely,

DONOHUE & ASSOCIATES, INC.

Stephen J. Haverl, P.G.
Senior Engineering Geologist

Robert E. Klink

Robert Klink, P.E.
Project Engineer

SJH/slg

enc: Soil Boring Logs
Well Installation Diagrams

cc: Ken Hein, DNR Solid Waste Specialist
Claude Lee, City of Ripon

LOG OF TEST BORING

(First Attempt)

JOB NO 97-1783 VERTICAL SCALE 1" = 4' BORING NO 1 (5)

PROJECT MONITORING WELLS, RIPON LANDFILL SOUTHWEST CORNER

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	LL/PL	Qu
1½	CLAYEY SILT; brown, moist, rather stiff (ML-CL)	LOESS	13		1	SB				
	SAND, fine-grained, some gravel, a little silt, reddish brown, damp,*	TILL	50/0.4		2	SB				
4	Auger Refusal at 4.0' END OF BORING									
	*very dense (SP-SM)									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
					to	
					to	
					to	
					to B-3	

START 10-8-81 COMPLETE 10-8-81

METHOD HSA 0-4.0' @

CREW CHIEF K. JOHNSON

LOG OF TEST BORING (Second Attempt)

JOB NO 97-1783 VERTICAL SCALE 1" = 4' BORING NO 1-A (5)

PROJECT MONITORING WELLS, RIPON LANDFILL SOUTHWEST CORNER

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	LL/PL	Qu
	No samples - see log of Boring 1									
3.8	Obstruction at 3.8'									
	END OF BORING									
	(This boring was 4 feet north of staked location)									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
					to	
					to	
					to B-4	
					to	

START 10-8-81 COMPLETE 10-8-81

METHOD @

HSA 0 - 3.8

CREW CHIEF K. JOHNSON

LOG OF TEST BORING (Third Attempt)

JOB NO 97-1783 VERTICAL SCALE 1" = 4' BORING NO 1-B (5)

PROJECT MONITORING WELLS, RIPON LANDFILL SOUTHWEST CORNER

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	LL/PL	Qu
	FILL, a mixture of tin cans, cardboard fiber, silty sand, gravel, cobbles	FILL			1	HSA				
3½	SAND, fine-grained, some gravel, a little silt, reddish brown, damp, very dense, with cobbles, a few boulders (SP-SM)	TILL	20		2	SB				
			59		3	SB				
			39		4	SB				
18	SILTY SAND, fine-grained, some gravel, light red, damp, dense (SM)		24		5	SB				
25	SAND, fine-grained, some gravel, a little silt, reddish brown, damp, medium dense (SP-SM)		17		6	SB				
			14		7	SB				
31	(CONTINUED ON NEXT PAGE)									
	A 2" monitoring wells was installed at this boring - see installation diagram.									

LOG OF TEST BORING

JOB NO 97-1783 VERTICAL SCALE 1" = 4' BORING NO 1-B (5)

PROJECT MONITORING WELLS, RIPON LANDFILL

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	L.L./P.L.	Qu
	Continued From First Page									
31	SAND, fine to coarse-grained, with gravel, brown, damp, a few boulders and cobbles, very dense (SW)		100/.5'		8	SB				
	A hard limestone slab at 35' and again at 38'									
	No Recovery from 39½ to 41'	OUTWASH	34		9	NSR				
42½	SAND, fine-grained, a trace of gravel, yellowish brown, moist to wet, very dense (SP)		-30		10	SB				
					11	SB				
49	SAND, fine to coarse-grained, with gravel, a little silt, a few ½" seams clayey silt, gray brown, water bearing, dense (SW-SM)	TILL	37		12	SB				
			56		13	SB				
56	END OF BORING									
	(This boring was 21' north and 9' west of staked location)									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
10-10	1035	46.5'	44.5'	46.2'	to	45.6'
10-10	1140	46.5'	44.5	45.9'	to	45.5'
					to B-6	
					to	

START 10-10-81 COMPLETE 10-10-81

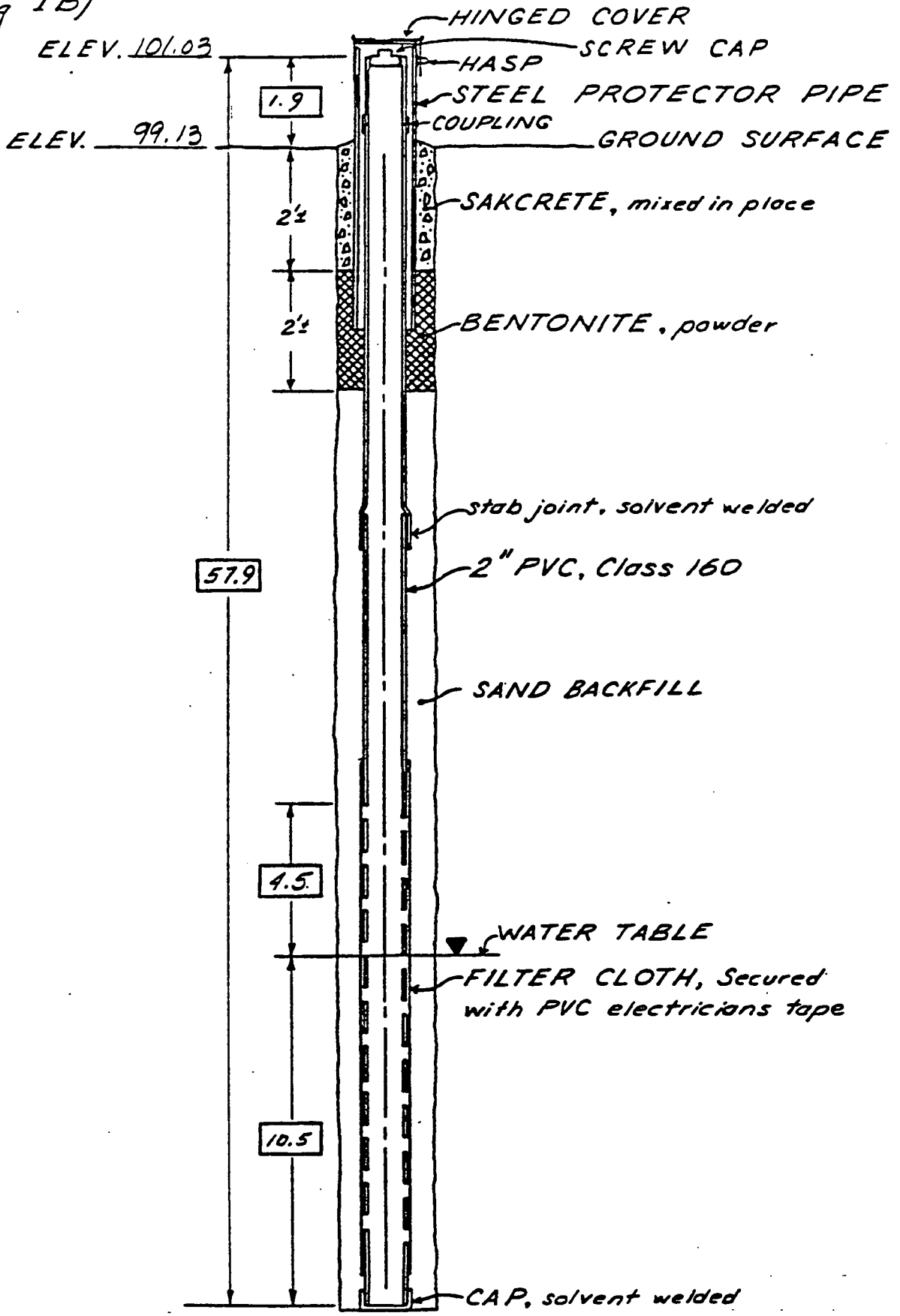
METHOD @ 1330

HSA 0-46'

DM 46-55.5'

CREW CHIEF K. JOHNSON

WELL #1 - RIPON
(Boring 1B)



LOG OF TEST BORING (First Attempt)

JOB NO 97-1783 VERTICAL SCALE 1" = 4' BORING NO 2 (6)

PROJECT MONITORING WELLS, RIPON LANDFILL SOUTHEAST CORNER

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	LL/PL	Qu
1½	CLAYEY SILT, dark brown, a few grass roots (ML-CL)	TOPSOIL	13		1	HSA				
	CLAYEY SILT, brown, moist (ML-CL)				2	HSA				
4	CLAYEY SILT, brown to gray mottled, lenses of sand, rather stiff (ML)	LOESS	10		3	SB				
7½	SILT, gray brown, wet, loose (ML)		5		4	SB				
11	SAND, very fine-grained, a little gravel, a little silt, light brown, damp, very dense (SP-SM)	OUTWASH	36		5	SB				
14	SAND, fine-grained, some gravel, a little silt, reddish brown, damp, some cobbles, a few boulders, very dense (SP-SM)	TILL	50/.1'		6	SB				
			85/.6'		7	SB				
	Auger Refusal at 25.3'		100/.1'		8	SB				
25.3					9	HSA				
	END OF BORING									
	(This boring was drilled at staked location)									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
					to	
					to	
					to	
					to	

START 10-9-81 COMPLETE 10-9-81

METHOD @

CREW CHIEF

LOG OF TEST BORING

JOB NO 97-1783 VERTICAL SCALE 1" = 4' BORING NO 2A (6)

PROJECT MONITORING WELLS, RIPON LANDFILL SOUTHEAST CORNER

DEPTH IN FEET	DESCRIPTION OF MATERIAL — SURFACE ELEVATION	GEOLOGIC ORIGIN	N	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	LL/PL	Qu
Not to Scale	No samples - refer to log of Boring 2									
14	SAND, fine-grained, some gravel, a little silt, brown, a few cobbles, boulders and limestone fragments, damp, very dense (SP-SM)	TILL	100/.5'		1	SB				
			100/.5'		2	SB				
34	Hard Continuous Limestone slab	LARGE BOULDER								
41	CONTINUED ON NEXT PAGE									

A 2" monitoring well was installed at this boring - see installation diagram.

LOG OF TEST BORING

JOB NO 97-1783 VERTICAL SCALE 1" = 4' BORING NO 2A (6)

PROJECT MONITORING WELLS, RIPON LANDFILL

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	LL/PL	Qu
41	Continued From First Page									
	SAND, medium to coarse-grained, with gravel, a little silt, brown, a few limestone fragments, water-bearing, very dense, a limestone slab at 43'	TILL	49		3	SB				
	END OF BORING (This boring was 7' west of staked location)									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
					to	
10-13	--	47'	47'	--	to	37'
					to B-10	
					to	

START 10-9-81 COMPLETE 10-9-81

METHOD @ 1735

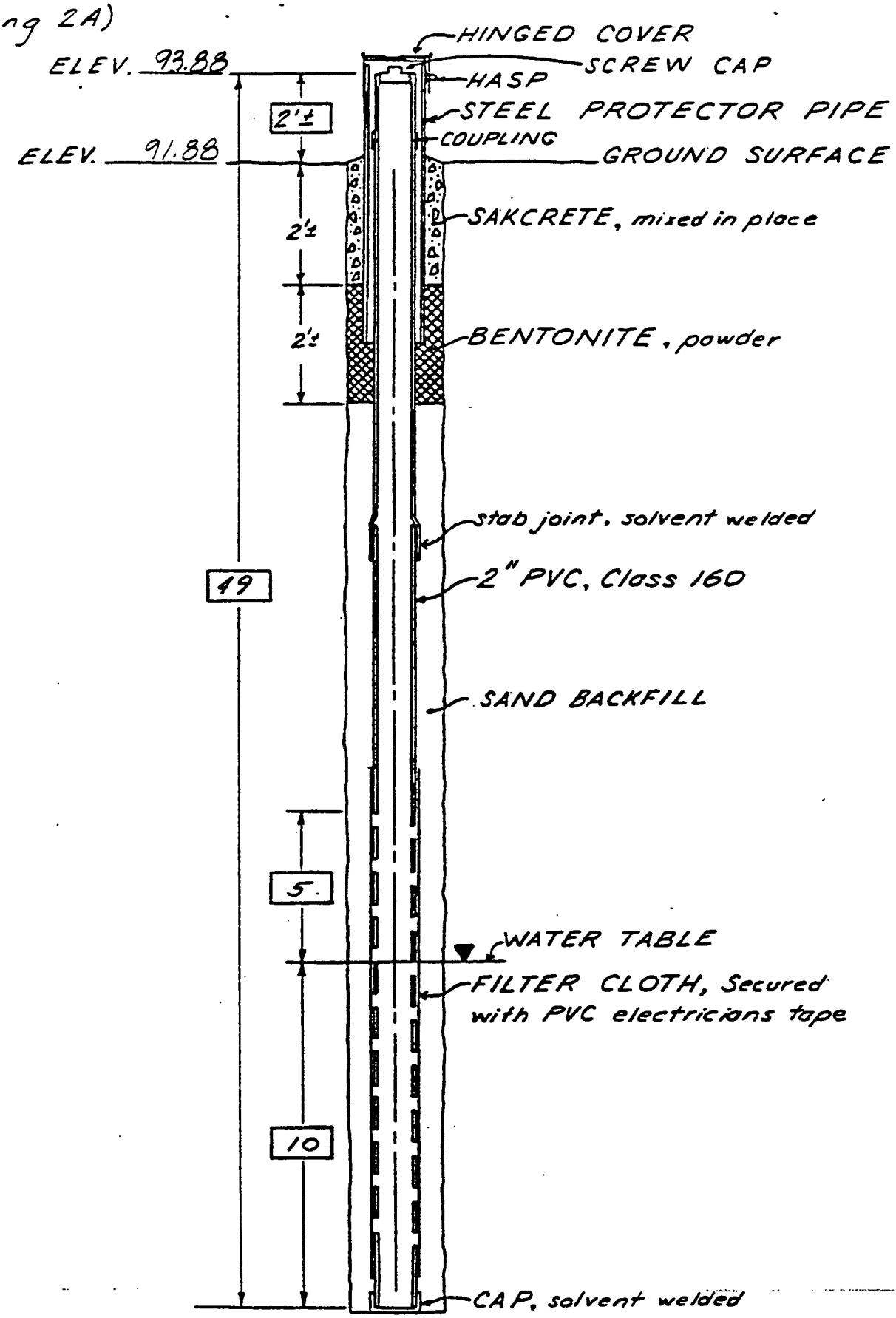
HSA 0-31.5'

DM 30.4-47.0'

CREW CHIEF K. JOHNSON

twin city testing

WELL 2 - RIPON
(Boring 2A)



SOIL TEST BORINGS	JOB NO. 97-1783	SCALE: None	DRAWN BY BMT	CHECKED BY

LOG OF TEST BORING

(First Attempt)

JOB NO 97-1783 VERTICAL SCALE 1" = 4' BORING NO 3 (7)

PROJECT MONITORING WELLS, RIPON LANDFILL NORTHWEST CORNER

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	LL/PL	Qu
	No samples - auger refusal at 3.9'									
	Cuttings were silty sand, cobbles and boulders	TILL								
3.9	END OF BORING									
	This boring was made 9' south of staked location.									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
					to	
					to	
					to	
					to	

START 10-13-81 COMPLETE 10-13-81

METHOD @ 0715

HSA 0-3.9

CREW CHIEF K. JOHNSON

LOG OF TEST BORING

(Second Attempt)

JOB NO 97-1783 VERTICAL SCALE 1" = 4' BORING NO 3A (7)

PROJECT MONITORING WELLS, RIPON LANDFILL NORTHWEST CORNER

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	LL/PL	Qu
	No Samples - cuttings were silty sand, cobbles and boulders									
		TILL								
	Hole abandoned at 24½ feet, too crooked to install well.									
24½	END OF BORING									
	This boring was 9' south and 8' east of the staked location.									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
					to	
					to	
					to B-13	
					to	

START 10-13-81 COMPLETE 10-13-81

METHOD @1130

HSA 0-19

DM & 3-15/16" tricone 19-24½

CREW CHIEF K. JOHNSON

LOG OF TEST BORING (Third Attempt)

JOB NO 97-1783 VERTICAL SCALE 1" = 4' BORING NO 3B (7)

PROJECT MONITORING WELLS, RIPON LANDFILL NORTHWEST CORNER

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	L.L./P.L.	Qu
	No Samples - cuttings were silty sand, cobbles and boulders.	TILL								
18½	Auger refusal at 18½'									
	END OF BORING									
	This boring was made 9' south and 23' east of staked location.									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
					to	
					to	
					to	
					to	

START 10-13-81 COMPLETE 10-13-81

METHOD @ 1300

HSA 0-18½

CREW CHIEF K. JOHNSON

LOG OF TEST BORING (Fourth Attempt)

JOB NO 97-1783 VERTICAL SCALE 1" = 4' BORING NO 3C (7)

PROJECT MONITORING WELLS, RIPON LANDFILL NORTHWEST CORNER

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	LL/PL	Qu
	No samples - cuttings were silty sand, cobbles and boulders	TILL								
6.8	Auger refusal at 6.8'									
	END OF BORING									
	This boring was made 29' south and 23' east of staked location.									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
					to	
					to	
					to	
					to	

START 10-13-81 COMPLETE 10-13-81

METHOD @ 1430

HSA 0.6.8

CREW CHIEF K. JOHNSON

LOG OF TEST BORING

(First Attempt)

JOB NO 97-1783 VERTICAL SCALE 1" = 4' BORING NO 4 (B)

PROJECT MONITORING WELLS, RIPON LANDFILL NORTHEAST CORNER

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	L.L./P.L.	Qu
	CLAYEY SILT TO SILT, brown, moist, rather stiff (ML-CL)	LOESS			1	HSA				
			9		2	SB				
6½	SAND, fine to coarse-grained, some gravel, a little silt, brown, damp, very dense, a few cobbles and boulders (SW-SM)	TILL	50/.3'		3	SB				
			50/.1'		4	SB				
15.1	Auger refusal at 15.1'									
	END OF BORING									
	(This boring was 40' south of staked location)									

WATER LEVEL MEASUREMENTS

DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
					to	
					to	
					to	
					to	

START 10-8-81 COMPLETE 10-8-81

METHOD @

HSA 0-15.1'

CREW CHIEF K. JOHNSON

LOG OF TEST BORING

(Second Attempt)

JOB NO 97-1783 VERTICAL SCALE 1" = 4' BORING NO 4A (B)

PROJECT MONITORING WELLS, RIPON LANDFILL NORTHEAST CORNER

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO	SAMPLE TYPE	LABORATORY TESTS W	D	LL/PI	Qu
	FILL, MOSTLY SILTY SAND, a little gravel and limestone, a few cobbles and boulders, dark brown	FILL			1	HSA				
4	SANDY CLAY, dark brown, seams of silty sand, trace of gravel, very stiff (CL)	POSSIBLE FILL	39		2	SB				
8½	SAND, fine-grained, a little gravel, brown, trace cobbles, a few boulders and limestone fragments, damp, very dense (SP-SM)	TILL			3	HSA				
			65/.2		4	SB				
17½	SAND, fine to coarse-grained, some gravel, a little silt, brown, a few cobbles and limestone fragments, water-bearing, dense (SW-SM)		32		5	SB				
			24		6	SB				
			27							
32	(CONTINUED ON NEXT PAGE)									

LOG OF TEST BORING

JOB NO 97-1783 VERTICAL SCALE 1" = 4' BORING NO 4A (8)

PROJECT MONITORING WELLS, RIPON LANDFILL

DEPTH IN FEET	DESCRIPTION OF MATERIAL (SURFACE ELEVATION ____)	GEOLOGIC ORIGIN	N	WL	SAMPLE NO.	SAMPLE TYPE	LABORATORY TESTS W	D	LL/PL	Qu
	(CONTINUED FROM FIRST PAGE)									
32	SAND, fine to coarse-grained, with gravel, a little silt, brown, a few cobbles and limestone fragments, possible boulders at 32½', water-bearing, very dense (SW-SM)	TILL	47		8 9	SB SB				
36½	END OF BORING									
	(This boring was made at staked location)									
	A 2" monitoring well was installed at this boring - see installation diagram.									

WATER LEVEL MEASUREMENTS

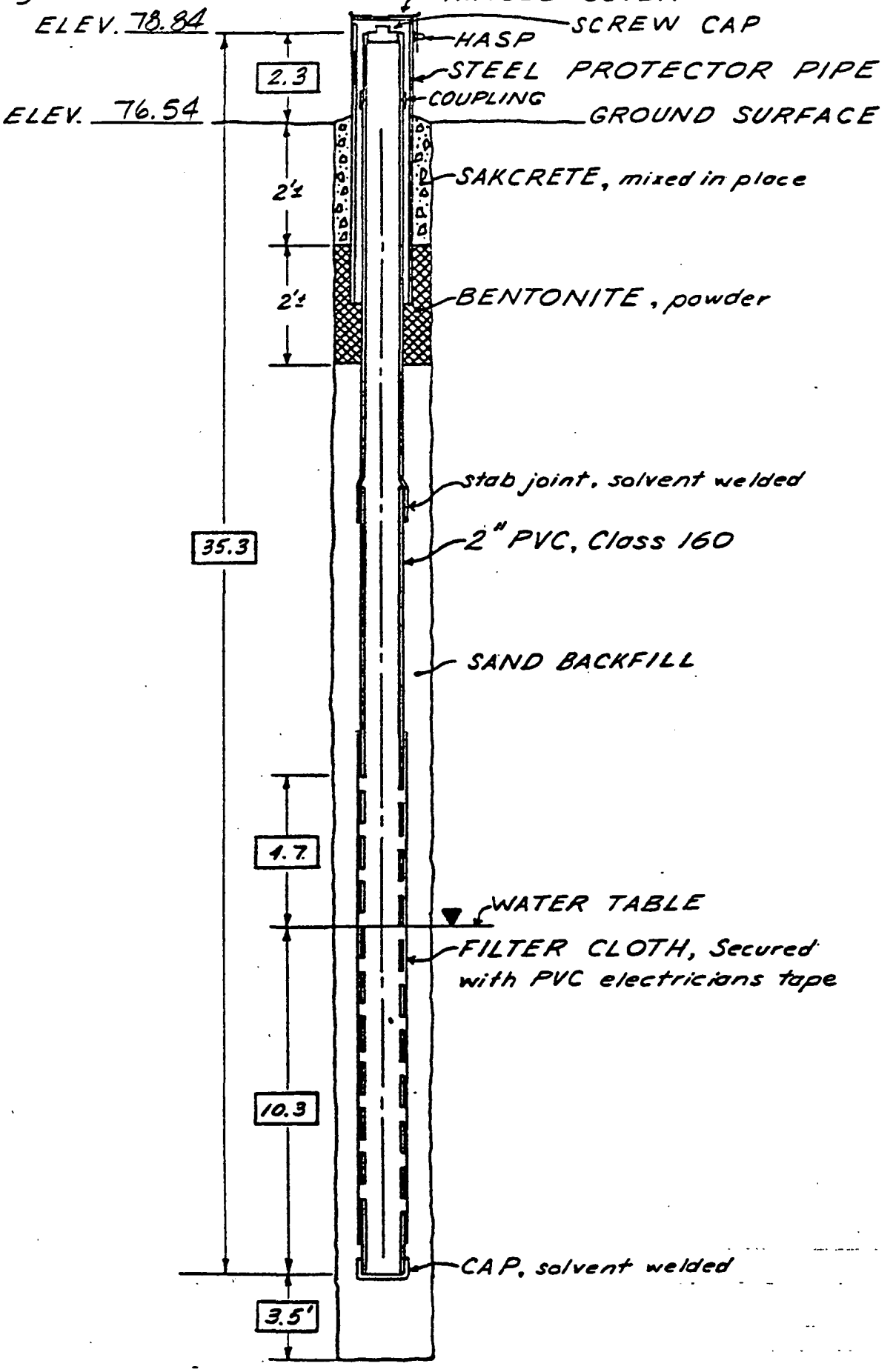
DATE	TIME	SAMPLED DEPTH	CASING DEPTH	CAVE-IN DEPTH	BAILED DEPTHS	WATER LEVEL
10-8	1525	26.5'	24.5'	24.3'	to	22.5'
10-8	1545	31.5'	29.5'	29.8'	to	22.8'
10-8	1610	36.5'	34.5'	33.8'	to	22.7'
					to B-18	

START 10-8-81 COMPLETE 10-8-81

METHOD HSA 0-34.5' @ 1615

CREW CHIEF K. JOHNSON

WELL 4 - RIPON
(Boring 4A)



MILWAUKEE, WI

GILES ENGINEERING ASSOCIATES, INC.
CONSULTING SOIL AND FOUNDATION ENGINEERS
W228N683 WESTMOUND DRIVE / WAUKESHA, WI 53186 / 414 544 0118

June 7, 1982

Donohue and Associates, Inc.
P.O. Box 1067
4738 North 40th Street
Sheboygan, Wisconsin 53081

Attention: Mr. Jay Batzner

Subject: Ripon Landfill
Ripon, Wisconsin
GEA Project No. 820328

Dear Jay:

Enclosed are the logs and diagram of the well construction for the above referenced project.

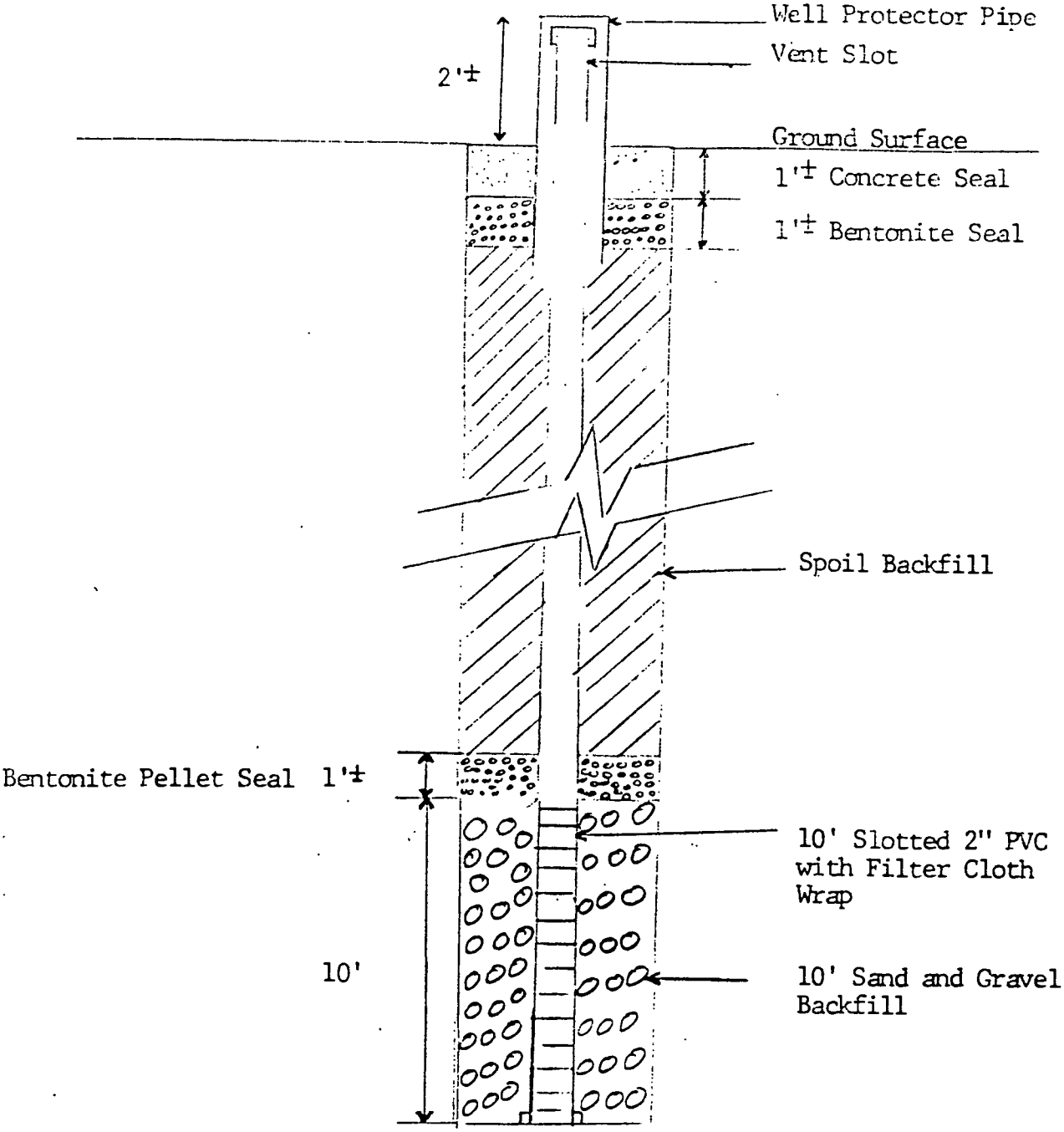
If you should have any questions or comments on this project, please do not not hesitate to call. Thank you for the opportunity to be of service.

Sincerely,

GILES ENGINEERING ASSOCIATES, INC.

Patrick D. Reuteman
Drilling Department Manager

PDR/jg
Enc: Logs 5A and B7
Well Diagram



TYPICAL WELL CONSTRUCTION

DONOHUE AND ASSOCIATES, INC.
RIPON LAND FILL
RIPON, WISCONSIN
GEA PROJECT NO. 820328

GILES ENGINEERING ASSOCIATES, INC.
CONSULTING SOIL AND FOUNDATION ENGINEERS

RECORD OF SUBSURFACE EXPLORATION

GILES ENGINEERING ASSOCIATES, INC.

CONSULTING SOIL AND FOUNDATION ENGINEERS

Boring No. 5A

Project: Donohue and Associates, Inc. Date: May 20, 1982

Ripon Land Fill, Ripon, Wis. GEA Project No.: 820328

DESCRIPTION Ground Surface Elevation	Depth Below Surface	Sample No. & Type	N	q_u	q_p	q_s	w	REMARKS
Silty Sand and Gravel with Cobbles		1-AU						
Silty Clay with fine to coarse Sand and Cobbles to Boulders - Moist	5'	2-SS	7					
	10'	3-SS	15					
	15'	4-SS	56					
	20'	5-SS	22					
Brown Silt, fine to coarse Sand, and Gravel with Cobbles and Boulders Damp	25'	6-SS	50					
	30'	7-SS	37					
	35'	8-SS	104					
Drove Boulder - No Sample	40'	9-SS	50/1"					
Drove Boulder- No Sample	45'	10-SS	50/0"					

Changes of strata indicated by the lines are approximate boundary between soil types. The actual transition may be gradual and may vary considerably between boring locations.

RECORD OF SUBSURFACE EXPLORATION

GILES ENGINEERING ASSOCIATES, INC.

CONSULTING SOIL AND FOUNDATION ENGINEERS

Boring No. 5A - Page Two

Project: Donohue and Associates, Inc. Date: May 20, 1982

Ripon Land Fill, Ripon, Wis. GEA Project No.: 820328

DESCRIPTION	Depth Below Surface	Sample No. & Type	N	q_u	q_p	q_s	w	REMARKS
		~~10-SS~~	~~50/0"~~					
Drove Limestone Boulders	50'	~~11-SS~~	50/0"					
Continuous Limestone Boulders No Sample	55'	~~12-SS~~	50/0"					
Gray Silt, fine to coarse Sand, and Gravel - Wet	60'	13-SS	60					
Brown fine to coarse Sand with some coarse to medium Gravel and Clay Wet	65'	14-SS	34					
	70'	15-SS	58					
Boring terminated at 71'	75'							
Well Installed to 69'	80'							

Changes of strata indicated by the lines are approximate boundary between soil types. The actual transition may be gradual and may vary considerably between boring locations.

GILES ENGINEERING ASSOCIATES, INC

RECORD OF SUBSURFACE EXPLORATION

CONSULTING SOIL AND FOUNDATION ENGINEERS

Boring No. B7

Project: Donohue and Associates, Inc. Date: March 31, 1982

Ripon Land Fill, Ripon, Wisconsin GEA Project No.: 820328

DESCRIPTION Ground Surface Elevation	Depth Below Surface	Sample No. & Type	N	q_u	q_p	q_s	w	REMARKS
Miscellaneous Garbage		1-AU						
Brown Silty Clay, with Gravel and Miscessaneous Garbage Fill Wet	5'	2-SS	3					
Brown Silty Clay, with Gravel and Miscellaneous Garbage Fill - Wet	10'	3-SS	9					
Brown fine to medium Gravel with Miscellaneous Garbage Fill - Wet	15'	4-SS	12					
Brown Silty Clay with fine to coarse Sand and Miscellaneous Garbage Fill - Wet	20'	5-SS	12					
Brown Silty Sand and Gravel with Miscellaneous Garbage Fill - Wet	25'	6-SS	7					
Brown fine to coarse Sand and Gravel with Miscellaneous Garbage-Fill -Wet	30'	7-SS	17					
Brown Silty fine to coarse Sand and Gravel with Miscellaneous Garbage Fill - Wet	35'	8-SS	35					
Brown fine to coarse Sands and Gravel with Cobbles & Boulders-Wet	40'	9-SS	64					
Gray Silt, fine to coarse Sand, and Gravel with Boulders - Wet	45'	10-SS	21					

Changes of strata indicated by the lines are approximate boundary between soil types. The actual transition may be gradual and may vary considerably between boring locati

RECORD OF SUBSURFACE EXPLORATION

GILES ENGINEERING ASSOCIATES, INC

Boring No. B7 Page Two

CONSULTING SOIL & FOUNDATION ENGINEERS

Project: Donohue and Associates, Inc. Date: March 31, 1982

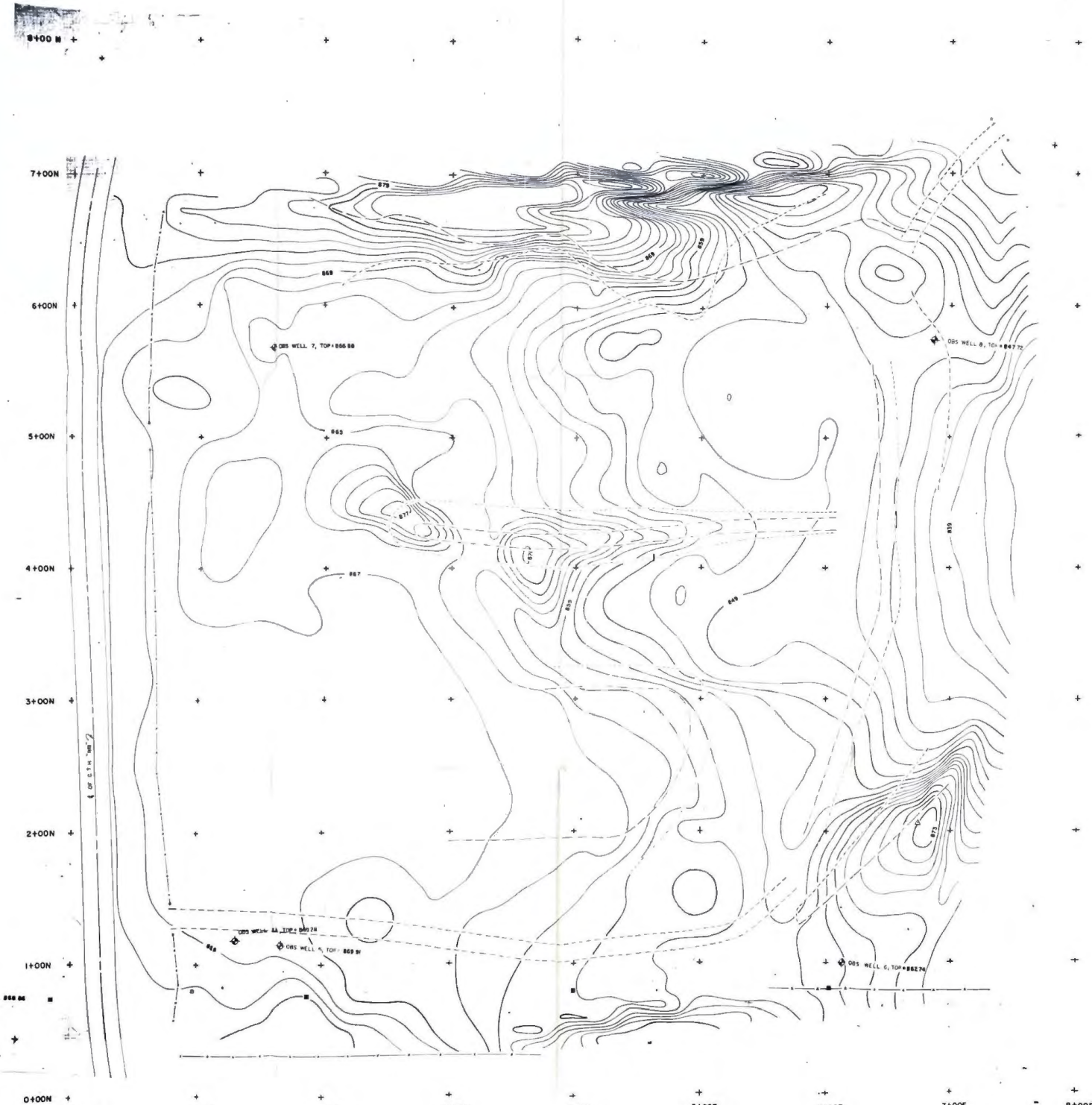
Ripon Land Fill, Ripon, Wisconsin GEA Project No.: 820328

DESCRIPTION	Depth Below Surface	Sample No. & Type	N	q_u	q_p	q_s	W	REMARKS
		10-SS	21					
Gray Siltyfine to coarse Sand with some fine to medium Gravel - Wet	50'	11-SS	30					
Boring terminated at 51'								
Well Installed to 50'	55'							
	60'							

Changes of strata indicated by the lines are approximate boundary between soil types. The actual transition may be gradual and may vary considerably between boring locations.

APPENDIX C

EXISTING SITE CONDITIONS



N

SCALE 0' 10' 20' 30' 60'

LEGEND

840 — EXISTING CONTOUR
ROADWAY
PROPERTY FENCE
OBSERVATION WELLS
POWER POLE

EXISTING SITE CONDITIONS

Donohue
Engineers & Architects

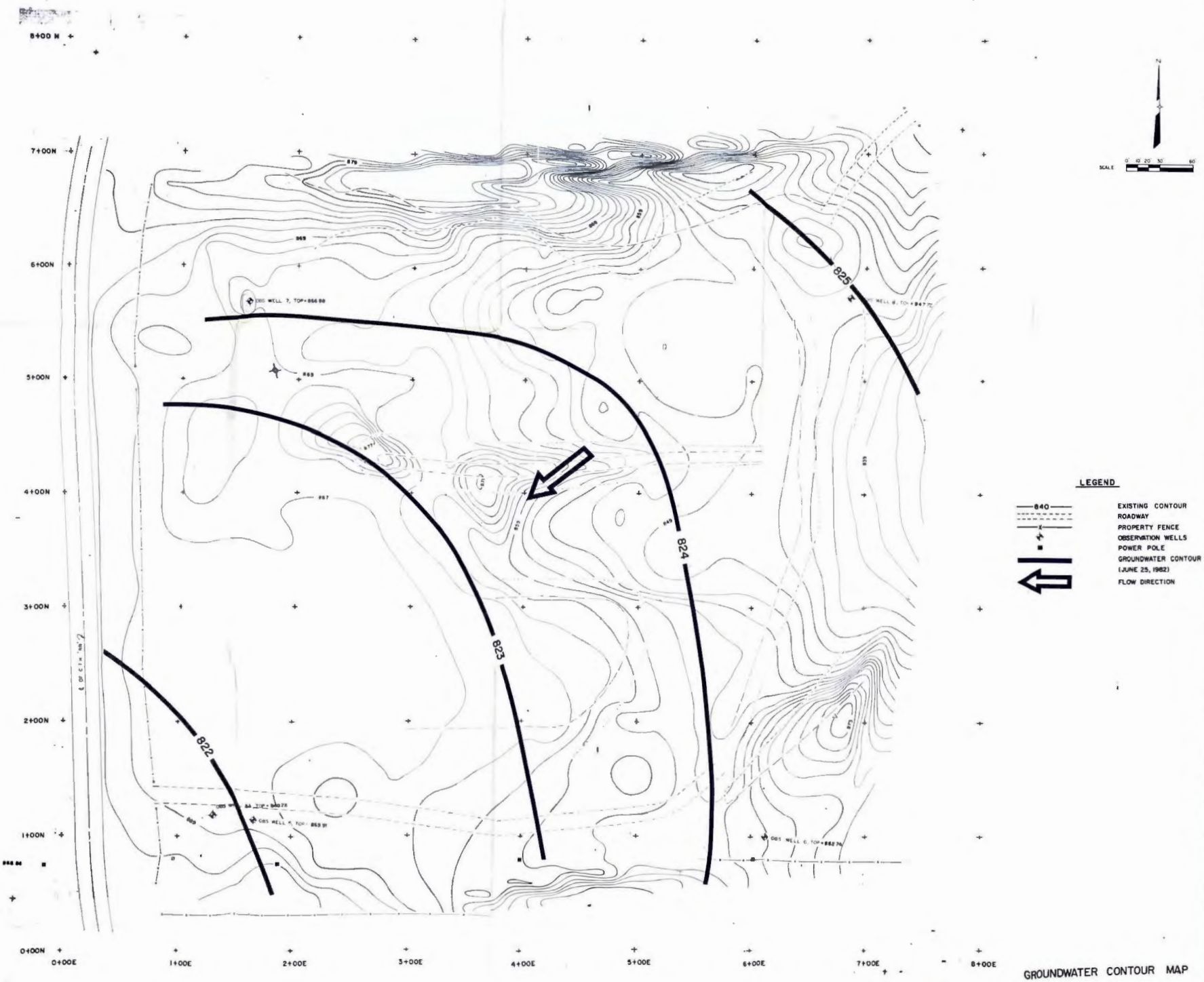
Scale	AS SHOWN
Date	JULY, 1982
Designer	S.REINFELDT
Drafter	D.HOLMES
Checker	S.REINFELDT
Approver	S.REINFELDT

OPERATIONS AND ABANDONMENT PLAN
CITY OF RIPON LANDFILL
FOND DU LAC COUNTY

Project No. 11829.000
File No.
C—1
Sheet No.

APPENDIX D

GROUNDWATER CONTOUR MAP



GROUNDWATER CONTOUR MAP

Donohue

Engineers & Architects

OPERATIONS AND ABANDONMENT PLAN
- CITY OF RIPON LANDFILL
FOND DU LAC COUNTY

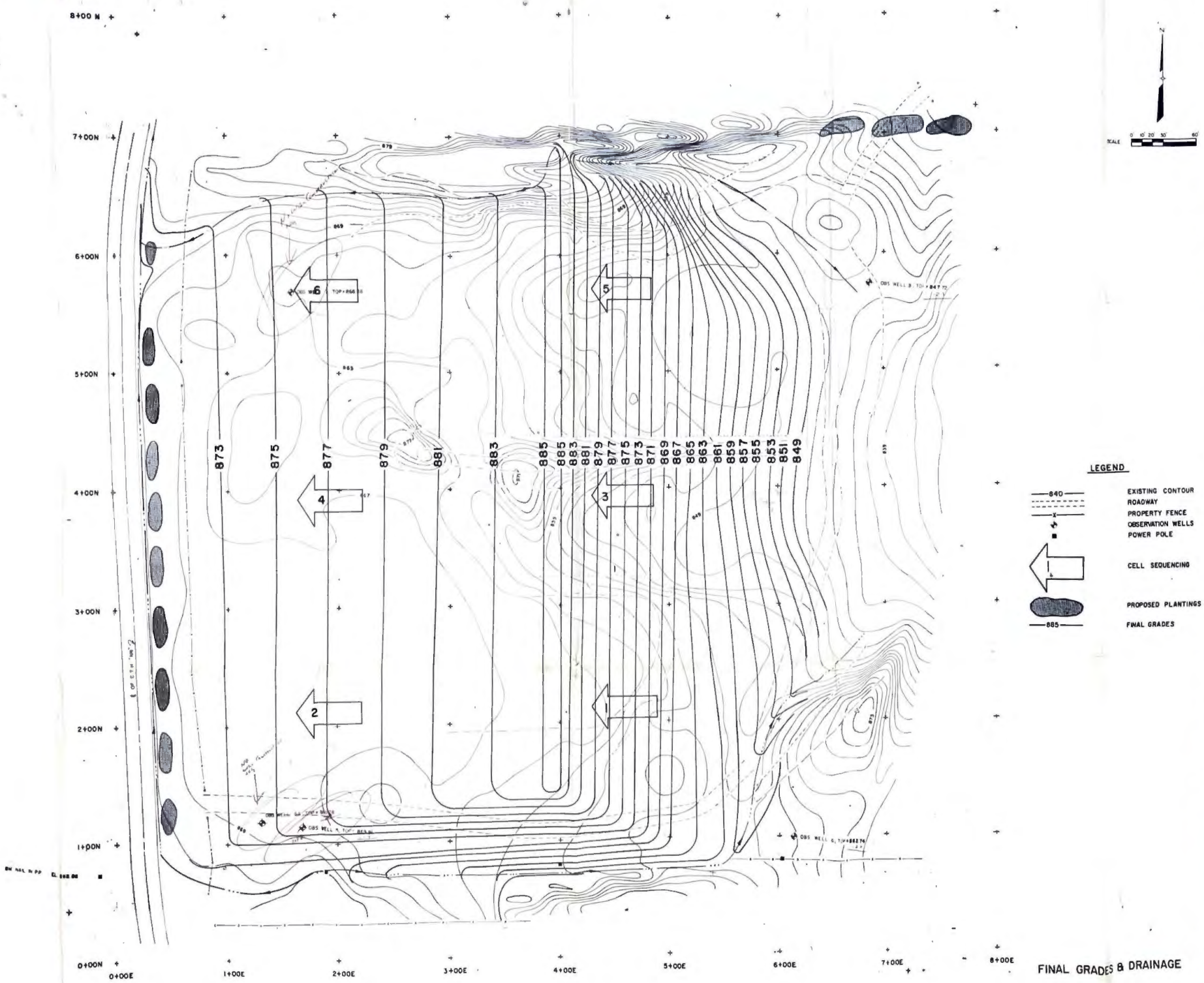
Scale AS SHOWN
Date JULY 1982
Designer S. REINFELDT
Drafter D. HOLMES
Checker S. REINFELDT
Approved S. REINFELDT

11829.000

D — 1

APPENDIX E

FINAL GRADES AND DRAINAGE



FINAL GRADES & DRAINAGE

Donohue
Engineers & Architects

Scale	AS SHOWN
Date	JULY, 1982
Designer	S. REINFELDT
Drafter	J.D. HOLMES
Checker	S. REINFELDT
Approver	S. REINFELDT

OPERATIONS AND ABANDONMENT PLAN
- CITY OF RIPON LANDFILL
FOND DU LAC COUNTY

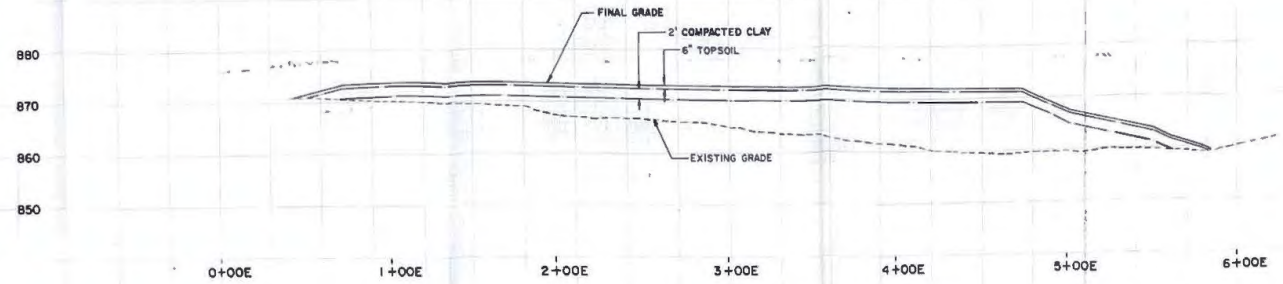
11829.000
Project No.

0-40282
File No.

E-1
Sheet No.

APPENDIX F

CROSS SECTIONS



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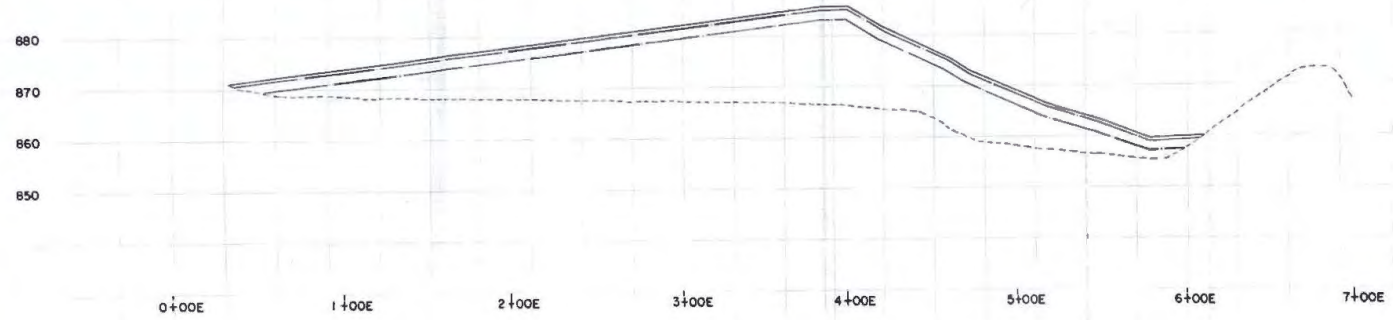

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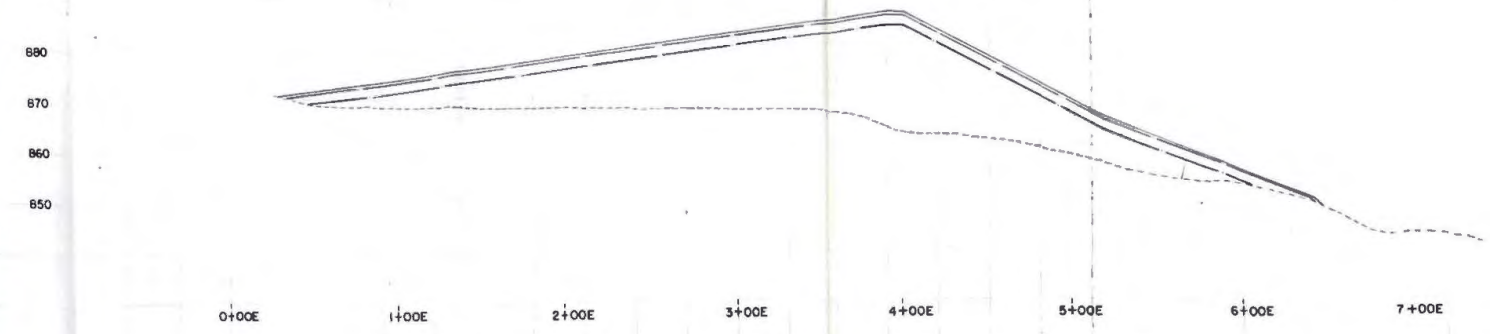


3+00N

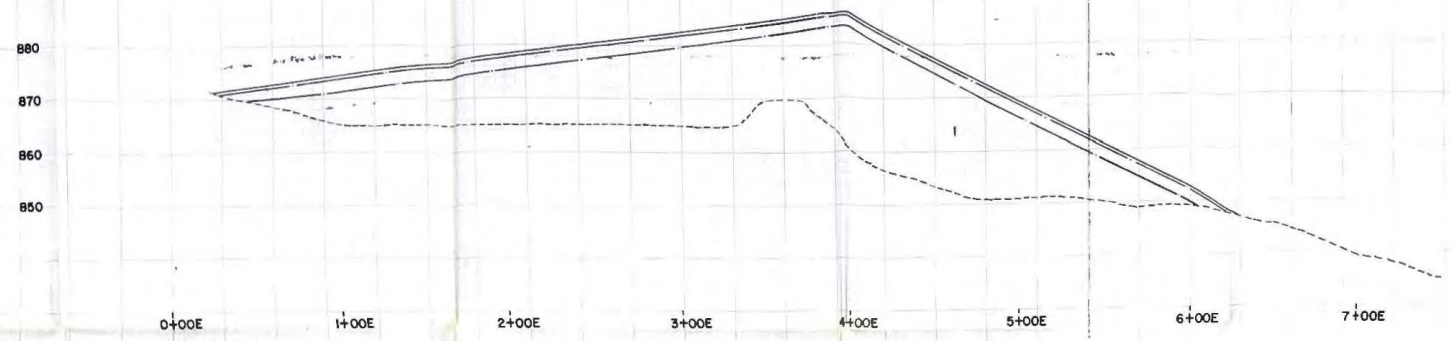
SCALE HORZ VERT

Donohue
Engineers & Architects

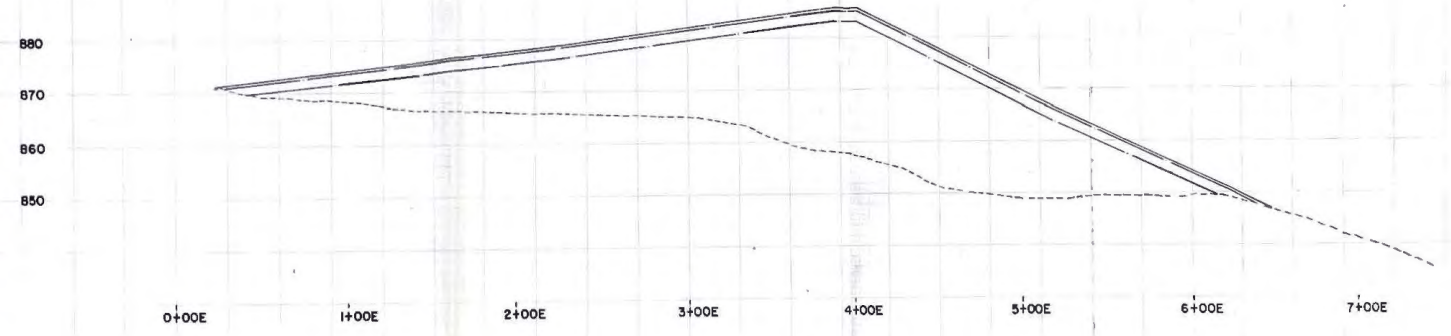
Scale AS SHOWN
Date MAY 1982
Designer T. FEINFELDT
Drafter J. WENDT
Checker T. FEINFELDT
Approver J. GARVIN

OPERATIONS AND ABANDONMENT PLAN
CITY OF RIPON LANDFILL
FOND DU LAC COUNTY

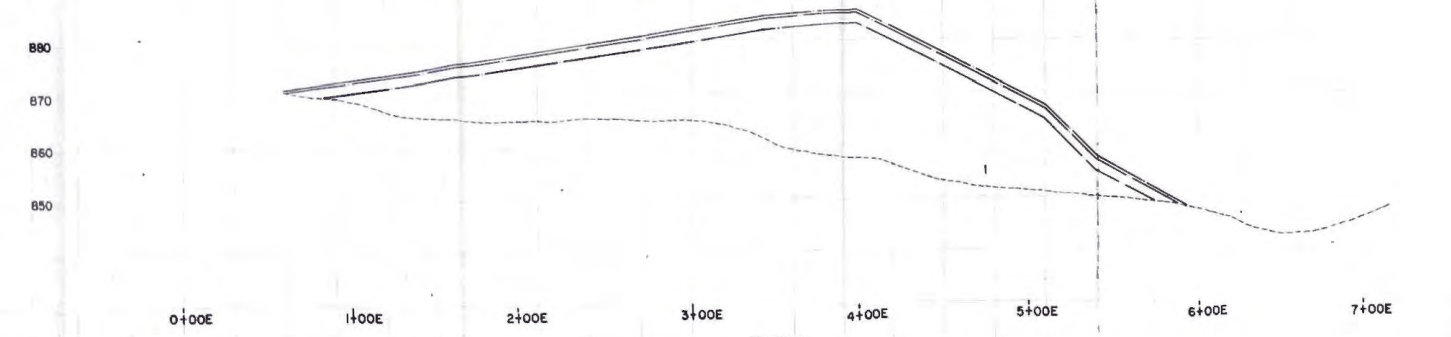
Project No. 11829.000
File No. G-40280
F-1



4+00N



5+00N



6+00N

SCALE 1"=10'

OPERATIONS AND ABANDONMENT PLAN
CITY OF RIPON LANDFILL
FOND DU LAC COUNTY

Donohue
Engineers & Architects

Scale	AS SHOWN
Date	MAY 1982
Designed	F.SCHEFLOT
Drafted	J.WENDT
Checked	F. SCHEFLOT
Approved	J. GARVIN

Project No. 11829.000
File No. G-40279
F-2
Sheet No.

APPENDIX G

WATER QUALITY DATA

July 30, 1981

City of Ripon
100 Jackson Street
Ripon, WI 54971

Attn: Mr. Claude Lee
Director of Public Works

Re: City of Ripon Landfill
Donohue Project No. 11829.000

Dear Mr. Lee:

At the July 7 meeting at the landfill with yourself, Donohue, and the DNR representative, the DNR representative stated that the City of Ripon should drain and treat (at the Ripon treatment plant) the standing liquid that has ponded on the northeast corner of the landfill site. As a result of this DNR order, we ran the following tests on the mixed and unmixed samples you procured for our lab on July 7, 1981.

The results are presented below:

Mixed Sample*	Unmixed Sample*
49 mg/l BOD	32 mg/l BOD
529 mg/l COD	349 mg/l COD
1,600 mg/l SS	76 mg/l SS
1.16 mg/l Total P	0.74 mg/l Total P
18.4 mg/l TKN	13.0 mg/l TKN
8.34 pH	8.62 pH
2,000 mmhos Conductivity	1,400 mmhos Conductivity
0.10 mg/l As	
0.01 Cd	
0.20 mg/l Cr	
0.10 mg/l Cu	
0.45 mg/l Pb	
47.2 mg/l Fe	
80.5 mg/l K	
0.17 mg/l Ni	
1.8 mg/l Zn	
250 mg/l Cl	

*We received one sample of the standing water (unmixed) and one sample after the pond was stirred (mixed).

From these results of the lab tests, it appears as though the liquid should not cause problems to the City of Ripon wastewater treatment plant based on suspended solids, BOD, and COD concentrations. The metals concentrations also do not appear to be high enough to be toxic to the activated sludge process. There was no pesticide scan run on the samples. It would be best, however, to feed the liquid to the plant slowly.

If there are any questions regarding these results, please feel free to contact us in this regard.

Very truly yours,

DONOHUE & ASSOCIATES, INC.

James W. Garvin, P.E.
Associate

BK/cm